4.12 ENERGY AND MINERAL RESOURCES

This section describes energy and mineral resources such as electricity, natural gas, oil, and sand and gravel in the vicinity of the proposed Project and evaluates the impacts that the Project and its Alternatives may have on these resources.

4.12.1 Environmental Setting

Regional Overview

The types of energy used in California include electricity, natural gas, and petroleum-based fuels.

Electricity use is measured both in watts and watt-hours (or equivalent). A watt is a measure of the rate of doing work, or electrical use or generation, and is defined as a unit amount of energy (a joule) produced in a second. One joule is approximately the energy required to heat one gram of dry, cool air by one degree Celsius.

The units of watts are used to measure the rate at which an electrical device uses energy (the amount of energy used in a given time) or the amount of energy a generator produces in a given time. A kilowatt is defined as 1,000 watts, a megawatt is defined as one million watts and a gigawatt is defined as one billion watts (or 1,000 megawatts). Power plants are generally measured by the rate at which they produce electricity. The San Onofre nuclear power plant is rated at 2,254 megawatts of power (2.2 gigawatts), enough power to supply an average 2.75 million households.

A kilowatt-hour (KWh) is a measure of the amount of total energy used by a device or produced by a generator. For example, if a 100 watt light bulb is left on for five hours, it would use 500 watt-hours of electricity, or 0.5 KWh. A two-megawatt generator produces 48 megawatt-hours (MWh) of electricity a day (24 hours). The numbers used in Table 4.12-1 are in gigawatt-hours (GWh) as the amount of electricity used in California is quite large.

Natural gas use is defined in terms of the volume of gas used, normally expressed in standard cubic feet, the standard meaning the amount of space the gas would take up if at standard temperature and pressure (60°F and 1 atmosphere pressure).

Petroleum based fuels are measured in volume, either gallons or barrels. A barrel equates to 42 gallons.

Table 4.12-1 summarizes California energy sources, their production, and consumption.

Table 4.12-1
Annual California Energy Consumption (2006)

Type of Energy Source	Produced In-State	Imported (from other states in US, or foreign)	Total Consumed (100%)
Electricity (Gigawatt-hours)	**225,788 (78.3%)**	**64,456 (21.7%)**	**288,245**
Natural Gas (billion cubic feet/billion cubic meters)	**319/9.0 (15.0%)**	**1,829/51.8 (85.0%)**	**2,148/60.8**
Crude Oil (1,000 barrels/ 1,000 cubic meters)	**266,052/42,299 (37.2%)**	**392,641/60,610 (62.8%)**	**647,276/102,909**
Gasoline (billion gal/million m^3)	**13.5/51.2**	**2.4/9**	**15.9/60.2**
Diesel (billion gal/million m^3)	**2.7/10.4**	**0.15/0.55**	**2.9/11**

Sources: CEC 2005a, 2006a, aggregated from Petroleum Industry Information Reporting Act data.

Electricity production in California is mostly fueled by natural gas, hydropower, and nuclear energy. Other energy sources that are used to produce electricity include coal, solar and wind power, biomass/waste, and geothermal energy (CEC 2005b). Electricity produced with natural gas as a fuel accounts for more than 37 percent (96,088 Gigawatt-hours (GWh)/year) of all electricity produced in the State.

According to the California Division of Oil, Gas and Geothermal Resources (DOGGR, California is estimated to have 3.8 trillion cubic feet (ft^3) (0.1 trillion cubic meters [m^3]) of natural gas in onshore reserves, and as much as 21 trillion ft^3 (0.6 trillion m^3) of natural gas in offshore reserves (DOOGR website, 2008). California produces approximately 319 billion ft^3 (9 billion m^3) per year of natural gas, which constitutes approximately 15 percent of the total natural gas consumed in the State. It is estimated by the California Energy Commission (CEC) that in the next 10 years, the annual average growth in demand for natural gas for electricity generation is expected to be approximately 0.1 to 1.9 percent (CEC 2006b) with the lower end being attributed to implementation of GHG reduction measure under AB-32.

In 2005, California oil refineries received 266 million bbl (42,299 m^3) of crude from California petroleum sources (CEC 2006a) and close to 390 million bbl of crude oil from outside the State. The State's refineries produce gasoline, diesel, jet fuel and other products from this crude oil.

A summary of energy consumption in California by consumption sector is presented in Table 4.12-2. The industrial sector consumes 15.2 percent of all California natural gas. In the industrial sector, the Petroleum Refining and Oil and Gas Extraction sub-sectors are among the highest consumers of natural gas, i.e., 47 percent of gas consumed by the industrial sector is consumed by the Oil and Gas Extraction sub-sector, and 20 percent by the Petroleum Refining sub-sector.

Petroleum extraction in California uses about 3,700 GWh of electricity yearly, or about 1.5 percent of all electricity consumed in California. The petroleum refining sub-sector consumes 7,266 GWh of electricity per year (CEC 2006d).

Table 4.12-2
Annual Energy Consumption in California by Sector and by Form

Sector or Sub-sector	Natural Gas, billion ft^3 (billion m^3)	Electricity, GWh
Transportation	< 1%	No data
Residential	469 (13.3)	79,721
Commercial	207 (5.9)	99,259
Industrial [1]	538 (15.2)	50,500
– Petroleum Refining	120 (3.4)	7,266
– Oil and Gas Extraction	253 (7.1)	3,700

Note:
[1] The Industrial Sector has many other sub-sectors; however, only the information on the two sub-sectors relevant to this EIR is provided here.
Sources: Recalculated from CEC 2005c, 2006b, 2006c.

The CEC publishes Energy Outlook reports in which historical energy consumption rates and predictions for the future are published. As the population in California grows, energy consumption is steadily increasing, and is predicted to increase at a rate of 1.0 percent to 2.2 percent annually (CEC 2000a, 2000b, 2001, 2004).

There are several minerals that are mined in California; however, there are no known mineral resources in the Project area (City of Goleta 2004; Santa Barbara County 2004).

Energy and Mineral Resources Consumption by the Existing Facilities

Operation of the existing facilities requires consumption of electricity, fuel gas and diesel fuels. Below are descriptions for each facility's consumption of these energy resources.

EOF

Electric power for the EOF is currently obtained from the SCE grid system. Year 2005 electric power consumption at the EOF averages approximately 3.6 Megawatts (MW) for a total annual electrical consumption of 31.7 GWh/year.

Approximately six to seven trucks and 20 employee vehicles enter the EOF per day, which consume diesel and gasoline. There are three equipment pieces at the EOF that use diesel as fuel: an emergency fire water pump, a compressor and an emergency generator. These equipment pieces are only operated during required testing and in emergencies. Non-emergency diesel consumption by this equipment is approximately 730 gallons per year (SBCAPCD 2005).

The following EOF equipment consumes the EOF in-plant gas as fuel: heater treaters HT-201, and HT-203, process heater H-204, and thermal oxidizers/flares H-205, H-206 and H-207. Total fuel gas consumption in 2005 was approximately 470 MMSCF.

Platform Holly

Electric power for Platform Holly is obtained from the SCE grid system. Current average power use at Platform Holly is approximately 2.6 MW for a total annual electrical consumption of 23.2 GWh/year.

Crew and supply boats which service Platform Holly consume diesel fuel. Several equipment pieces associated with the drilling rig on the platform also operate on diesel including the slick line unit, the coiled tubing unit, the hydraulic unit, the drilling crane, the electric line unit, the cement unit, the compressor and the nitrogen unit. The platform pedestal crane and the emergency electrical generator also consume diesel. Diesel consumption by the equipment related to platform operations is approximately 260 thousand gallons per year (SBCAPCD 2005).

The following equipment located on Platform Holly consumes fuel gas: the three power generators associated with the drilling rig (#1, #2, and #3), the high-pressure flare, and the low-pressure flare. EOF fuel gas is delivered to the platform through the 4-inch utility pipeline from the EOF. Fuel gas consumption by the platform is approximately 37 MMSCF per year (SBCAPCD 2005).

EMT

The EMT consumes electricity to operate two electrically driven oil-shipping pumps, a fire water pump, lighting, the access gate, and operational and safety controls. Electric

power for the EMT is obtained from the existing SCE electric grid system. The electric power consumption rate at the EMT has been approximately 150 kilowatts (kW) during barge loading operations. The remainder of the time, there is a negligible load. Thus, the EMT consumes total energy of approximately 2 MWh to 2.5 MWh per loading, or 50 MWh to 65 MWh per year.

The emergency response boat, and the tug and assist vessels, that assist movements of the Barge *Jovalan*, have diesel engines. The Barge *Jovalan* is equipped with four internal combustion diesel engines used in vapor recovery. Annual consumption of fuel by these engines while at the EMT is approximately 27,000 gallons per year (SBCAPCD 2002, 2003 and 2004). Transportation of the crude oil to Long Beach consumes an estimated 600,000 gallons of diesel fuel per year. Small amounts of diesel or gasoline are also consumed when maintenance crews visit the EMT.

The Project facilities do not use any other mineral resources, nor do they occupy an area that contains other known mineral resources.

Energy and Mineral Resources Production by the Project Facilities

The Project facilities produce, treat and transport oil and natural gas produced from the State offshore leases. Other production items include liquefied petroleum gas, natural gas liquids and elemental sulfur. The facilities' crude oil and natural gas throughputs are 1,137,400 barrels of oil per year, and 1.89 billion cubic feet of gas per year. Other petroleum products produced that can be used as fuels include Liquefied Petroleum Gas (LPG) of almost 3.3 million gal/yr, and Natural Gas Liquids (NGL) of about 1 million gal/yr.

4.12.2 Regulatory Setting

Federal

Title 10 of the Code of Federal Regulations (CFR) addresses energy consumption and the establishment of the Department of Energy. Issues addressed by Title 10 include:

- State energy programs;
- Energy conservation programs;
- Energy efficiency of industrial and commercial products;

- Alternative fueled vehicles;
- Power plant regulations;
- Department of Energy provisions; and
- Nuclear Regulatory Commission and Nuclear facilities.

Title 18 of the Federal CFR addresses the Federal Energy Regulatory Commission (FERC), which handles issues related to natural gas and oil transportation, provisions, and tariffs.

Title 30 of the Federal CFR establishes the Minerals Management Service (MMS), which manages energy resources in the Federal outer continental shelf (OCS).

State

In addition to the California Environmental Quality Act (CEQA), there are other acts and regulations that govern energy production, utilization, conservation, and development of new energy sources.

The State of California adopted the Warren-Alquist Act to encourage conservation of non-renewable energy resources. This Act created the State Energy Resources Conservation and Development Commission. This Act has been codified in the Public Resources Code – Division 15, Energy Conservation and Development. Other State statutes related to efficient utilization of energy resources and energy conservation include:

Financial Code – Division 15.5,

- Section 32000 *et seq*. State Assistance Fund for Energy, California Business and Industrial Corporation;

Government Code – Title 2,

- Section 14450 *et seq.* Part 5, Chapter 4 – California Transportation Research and Innovation Program;
- Section 15814.10 *et seq.* Part 10b, Chapter 2 – Energy Conservation in Public Buildings;

- Section 15814.30 *et seq.* Part 10b, Chapter 2.8 – Energy Efficiency in Public Buildings;

Public Resources Code – Division 3,

- Section 3800 *et seq*., Chapter 6 – Disposition of Geothermal Revenues; Public Resources Code – Division 6;
- Section 6801 *et seq*. Part 2, Chapter 3 – Oil and Gas and Mineral Leases; Public Resources Code – Division 16;
- Section 26000 *et seq.* – California Alternative Energy Source and Advanced Transportation Authority Act;

Public Resources Code – Division 16.5,

- Section 26400 *et seq.* – Energy and Resources Fund;

Public Utilities Code – Division 1,

- Section 330 *et seq.* Part 1, Chapter 2.3 – Electrical Restructuring;
- Section 445 *et seq.* Part 1, Chapter 2.5 – Public Utilities Commission Reimbursement Fees;
- Section 701 *et seq.* Part 1, Chapter 4 – Regulation of Public Utilities;
- Section 1001 *et seq*. Part 1, Chapter 5 – Certificates of Public Convenience and Necessity;
- Section 2801 *et seq.* Part 2, Chapter 7 – Private Energy Producers;

Revenue and Taxation Code – Division 2,

- Section 40001 *et seq.* Part 19 – Energy Resources Surcharge Law;

Vehicle Code – Division 3,

- Section 5205.5 and 21655.9 *et seq.* – Vehicle Code; and

Vehicle Code – Division 12,

- Section 28110 *et seq*. – Chapter 5, Article 16 – Methanol or Ethanol Fueled Vehicles.

The California Department of Conservation is the primary agency with regard to mineral resource protection. The Department is charged with conserving earth resources (Public Resources Code sections 600-690) and has five program divisions that address mineral resource issues:

- Division of Mines and Geology;
- Division of Oil, Gas, and Geothermal Resources;
- Division of Land Resource Protection;
- Division of Recycling; and
- Office of Mine Reclamation.

The State Mining and Geology Board develops policy direction regarding the development and conservation of mineral resources and reclamation of mined lands.

Other State agencies with statutory authority in regard to mineral resources issues include:

- Coastal Commission (for land uses that could affect access to mineral resources within the Coastal Zone);
- State Water Resources Control Board (as pertains to mineral resource water quality-related issues); and
- Energy Commission.

Local

Santa Barbara county regulates energy development, oil and gas development in particular, through the Coastal Plan. In the coastal zone, priority is given to coastal-dependent projects, which include oil and gas projects that involve offshore oil and gas facilities.

4.12.3 Significance Criteria

A significant impact would occur if the Project would:

- Result in the loss of availability of a known energy or mineral resource that would be of value to the region and the residents of the State;
- Conflict with the adopted California energy conservation plans;
- Use non-renewable energy resources in a wasteful and inefficient manner;
- Result in a substantial increase in demand upon existing power or natural gas utilities; or
- Result in a need for new systems or supplies or substantial alterations to the existing power and natural gas utilities.

4.12.4 Impact Analysis and Mitigation

Impact ER-1: Change in Electricity Use by the Project

Impacts from increased electricity consumption at the Project facilities due to higher operation loads of the existing electrical equipment and consumption by new equipment (Less than Significant, Class III).

Impact Discussion

Both Platform Holly and the EOF would have higher electrical usage on the existing electrical equipment due to the proposed Project. This would occur because of the increased oil and gas throughput through these facilities. Higher electrical usage would also be due to new electrical equipment proposed to be installed at both facilities. The major power consumption increase at the EOF with the proposed Project would be by the vacuum pumps of the Pressure Swing Adsorption (PSA) System proposed for CO_2 and heavy hydrocarbons removal from the produced gas. The power consumption for the vacuum pumps would be about 1,000 kW. Electrical use would increase at the EOF to 5,213 kW under normal operation, or a total electrical energy use annually of 45.7 GWh/year. Peak use, on a maximum day, would be 9,301 kW, possibly experienced during turnarounds and plant startups.

The estimated average power use for Platform Holly for the proposed Project would be 2,982 kW under normal operation conditions or a total electrical energy use annually of 46 GWh/year. Peak use, on a maximum day, would be 6,077 kW, possibly experienced during turnarounds and plant startups.

As the EMT would be removed under the proposed Project, the electrical power requirements at the EMT of 50 MWh to 65 MWh per year would be eliminated.

The proposed Project includes installation of a new power generation system incorporating waste heat recovery, SCR for NO_x reduction and retrofit installation of low NO_x burners on the existing heater H-205. Up to four General Electric Jenbacher JMS 620 power generators would be installed producing electricity of 1.6 MW each when operating on the EOF in-plant gas and utility gas. Electrical generation from the proposed Project generators would produce 6.4 MW, or a total annual energy production of 56 GWh/year. It is estimated that, based on energy balances, approximately 20 percent of the generator fuel would be natural gas from the Gas Company utility in order to operate the generators at full load. Power could both be used by the EOF and Platform Holly and sold to the electrical utility grid depending on load.

Future average power consumed for both the EOF and Platform Holly would be 8,195 kW, with an average utility supplied power requirement of approximately 1,795 kW, and an estimated contribution of onsite power generation of 6,400 kW. During peak power operations at the Project facilities, the power supplied by the utility could reach approximately 8.9 MW with 6 MW consumed by Holly, 9.3 MW consumed by the EOF and 6.4 MW produced by the onsite generators.

The average annual electricity purchased from the utility for the Project facilities would decrease as compared to the baseline use by approximately 40 GWh per year, due to the installation of the proposed power generation units. However, there could be days of peak consumption, when the Project would have higher than the baseline consumption from the grid. Because the Project would not increase demand on the power utilities, and would not require any alterations to the existing power utilities, the Project would have *a less than significant impact* (Class III) on electricity.

Table 4.12-3
Proposed Project Electricity Usage

Facility	Current Usage/ Generation Rate (kW)	Proposed Project Usage/ Generation Rate (kW)	Current Total Annual Electricity Consumption (GWh)	Proposed Project Total Annual Electricity Consumption (GWh)
Platform Holly	2,646	2,982	23.18	26.12
EOF	3,619	5,213	31.70	45.67
EMT	150	0	0.93	0
EOF Generation	0	-6,400	0	-56.06
TOTAL	**6,415**	**1,795**	**55.81**	**15.72**

Impact ER-2: Change in Fossil Fuel Availability due to the Project

Impacts from diesel and natural gas consumption and production by the Project facilities (Beneficial, Class IV).

Impact Discussion

The Project would be a net producer of petroleum fuels, e.g., fuels that can be produced from natural gas and crude oil. However, this increase in production will not serve to increase the demand for natural gas or crude oil, but rather would serve to replace natural gas and crude oil supplies from other places. Given that California is lacking in crude oil and natural gas, it is likely that the Project crude oil and natural gas production would displace material currently being imported from outside of California or offset decreased production in other areas of California.

Construction equipment (pipeline construction, demolition of the EMT and changes at the EOF) would require both gasoline and diesel fuel. However construction is a temporary short term activity and would not significantly affect supplies of fuel in the area.

At the EOF, with the proposed Project, some of the existing fuel gas consuming equipment would be removed, such as the burners and associated exhaust stacks for HT-201, and HT-203. H-204 would use the exhaust gases from the generators to heat process fluids and would not combust fuel. Thermal oxidizers/flares H-205, H-206 and H-207 would have reduced use due to the co-generation use of the generators which would provide destruction of plant gases instead of the flares.

However, increased production levels would generate more plant gases than the current operations and some utility natural gas would be used to operate the generators at full load. Therefore, annual fuel combustion would increase over current operations to approximately 1,200 MMSCF used for the generators and an estimated 34 MMSCF used annually for the H-205 heater.

Diesel consumption related to the EOF operations would be due to the fire water pump, compressor and power generator and would remain the same as current operations. The EOF employees' commuter vehicles would remain the same as current operations. With the Project, the number of trucks servicing the facility would increase mainly due to the increase in the number of Liquid Petroleum Gas and sulfur removal trucks.

At Platform Holly, fuel gas combustion would decrease due to the decrease in use of the drilling generators and increased use of electricity supplied by the EOF. Flaring is estimated to be the same as current operations.

Diesel consumption related to Platform Holly operations is associated with the crew and supply boat engines and drilling engines. The estimated total annual consumption by this equipment would be about 450 thousand gallons. This increase over the current operations is due primarily to the increase in operations of the supply boats during drilling.

Diesel consumption at the EMT is associated with the tug and assist vessels that propel the barge (including the fuel that is used outside of Santa Barbara county), by the internal combustion engines on the Barge *Jovalan* that are part of the vapor recovery system, and by the emergency response vessel that is present while the Barge *Jovalan* is loaded. With the proposed Project, the EMT operations would cease, and there would be no consumption of energy resources by the EMT facilities.

The proposed Project would produce an average of about 4,300 bbl crude/day over the life of the Project. Crude oil is used for the production of gasoline and diesel fuels and other products. An average 9.6 gallons of diesel and 19.5 gallons of gasoline could be produced per barrel of crude. Thus, potentially, the Project could result in production of an average of about 84,000 gallons of gasoline, and 41,300 gallons of diesel fuel per day over the life of the Project.

The gas produced by the Project would average about 4.7 MMSCFD over the life of the Project.

The Project facilities would consume significantly less fuel as compared to the amount that would be produced as a result of the proposed Project. Thus, the net effect on fossil fuels supply would, therefore, be *beneficial (Class IV).*

Table 4.12-4
Summary of Energy and Mineral Resources Impacts and Mitigation Measures

Impact	Impact Class	Mitigation Measures
ER-1: Change in Electricity Use by the Project	Class III	None required.
ER-2: Change in the Fossil Fuel Availability due to the Project	Class IV	None required.

Extension of Life Impact

The Applicant has stated that the proposed Project would not increase the life of the existing South Ellwood Field Facilities, which is currently defined by the operational life of Platform Holly until 2040, and would likely reduce the overall duration of oil and gas production from existing facilities due to more efficient extraction of the resource. However, it is possible that increased oil and gas production from new wells drilled into the existing and proposed leases, formations (Lower Sespe) and fault blocks (North Flank and Eagle Canyon) could produce economically viable resources for a longer-than-expected period and increase the life of the existing facilities. Therefore, the impacts identified in Table 4.12-4 have the potential to occur over a longer period than assumed for the proposed project, exacerbating potentially adverse impacts.

Increasing the project duration and continued operation of facilities extend the period of utilization of electricity from the regional grid and impacts would be considered potentially adverse but less than significant (Class III).

4.12.5 Impacts Of Alternatives

No Project Alternative

Under the No Project Alternative, the Applicant would not fully develop oil and gas resources contained in the eastern portion of the South Ellwood Field.

With the No Project Alternative, there would be no power generation units installed at the EOF. The EMT would not be decommissioned, and would continue to be used as

part of the oil transportation network. Impact **ER-1** would be eliminated, and there would not be a beneficial energy impact related to additional crude oil and natural gas production at the facilities (Impact **ER-2**).

Currently, lease agreements for the operations of the EMT will expire in 2013 and/or 2016 (see Section 2.0, Project Description). It is assumed that, under the No Project Alternative, after the lease expirations, the Applicant would pursue alternative means of crude oil transport such as pipeline or truck transportation. The impacts of these transportation modes are described in the Venoco Ellwood EMT Lease Renewal Project Draft EIR (CSLC 2007). Any future crude oil transportation options would be subject to appropriate agency review and approval.

No EOF Modifications

Under this alternative, no energy generation equipment would be installed at the EOF. It is assumed that the existing generators would be operated at full load on Platform Holly, thereby generating an estimated 1.9 MW, or about 17.3 GWh per year. This would offset the increase in electrical requirements associated with the Project and impact **ER-1** would be less than significant. However, the impacts would be more adverse since there would be no net reduction in electrical use from the utility due to the generation of electricity at the EOF.

The same oil and gas reserves would be produced, therefore, Impact **ER-2** would be the same as for the proposed Project.

Processing on Platform Holly

Under this alternative energy generation equipment would be installed, either at Platform Holly, or at the EOF. Impact **ER-1** would be less than significant, the same as the proposed Project.

The same oil and gas reserves would be produced, therefore, Impact **ER-2** would be the same as for the proposed Project.

Las Flores Canyon Processing: Offshore Gas and Onshore Oil Pipeline

Under this alternative, energy generation equipment would not be installed at the EOF and the EOF would be removed. Electrical consumption associated with the EOF would not longer exist. However, there would be increased electrical consumption at the LFC

due to an increase in processing. Electrical use at the LFC would increase, yet the increase would not constitute a "substantial" increase in demand on the electrical grid. Therefore, impact **ER-1** would be less than significant. Although the LFC has a cogeneration system, it is currently operating at close to capacity.

The same oil and gas reserves would be produced, therefore, Impact **ER-2** would be the same as for the proposed Project.

Las Flores Canyon Processing: Offshore Gas and Offshore Oil Pipeline

This alternative would be the same as the alternative discussed above, LFC Processing: Offshore Gas and Onshore Oil Pipeline.

4.12.6 Cumulative Projects Impact Analysis

The Project would be producing new energy resources and would result in increased supplies of energy to other potential projects. The reduction in electrical use from the electrical grid, due to the installation of the generators under the proposed Project, would free up supplies of electricity to other potential projects. Cumulative energy impacts are, therefore, considered to be beneficial.

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